

Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference Wa 10225-W	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/008177	International filing date (day/month/year) 24 July 2003 (24.07.2003)	Priority date (day/month/year) 01 August 2002 (01.08.2002)
International Patent Classification (IPC) or national classification and IPC F16C 33/24, 33/04, C04B 35/56, 35/565		
Applicant ESK CERAMICS GMBH & CO. KG		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.  
☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 29 January 2004 (29.01.2004)	Date of completion of this report 25 October 2004 (25.10.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/008177

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
pages \_\_\_\_\_ 1-12 \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement under Article 19  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_ 1-6 \_\_\_\_\_, filed with the letter of \_\_\_\_\_ 14 May 2004 (14.05.2004)
- ☒ the drawings:  
pages \_\_\_\_\_ 1/3-3/3 \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☒ the claims, Nos. \_\_\_\_\_ 7-12 \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.  
PCT/EP 03/08177

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Claims	2-5	YES
	Claims	1, 6	NO
Inventive step (IS)	Claims	3-5	YES
	Claims	1, 2, 6	NO
Industrial applicability (IA)	Claims	1-6	YES
	Claims		NO

### 2. Citations and explanations

#### 1. Reference is made to the following documents:

D1: QUICK NATHANIEL R.: "Laser Synthesis of Conductive Phases in Silicon Carbide Thin Film and Bulk Substrates" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON LASERS, Vol. D, 1994, pages 696-702, XP001155543

D2: QUICK NATHANIEL R.: "Laser synthesis of conductive phases in silicon carbide and aluminum nitride" NOVEL TECHNIQUES IN SYNTHESIS AND PROCESSING OF ADVANCED MATERIALS, PROCEEDINGS OF A SYMPOSIUM, 1995, pages 419-432, XP009018887

D6: WO 01/16054 A (UNIV ILLINOIS) 8 March 2001 (2001-03-08)

D7: WO 02/02956 A (BLEISTAHL PROD GMBH & CO KG; DALAL KIRIT (DE); SPANG WALTER (DE)) 10 January 2002 (2002-01-10)

#### 2. The subject matter of claims 1 and 6 does not appear novel (PCT Article 33(2)). The reasons are as follows:

According to claim 1, the method can be carried out in the presence of a reaction gas, a protective gas or in a vacuum.

Document D1 (entire document, particularly "experimental procedures" and figure 2) or document D2 (entire document, particularly "experimental procedures" and figures 2, 3 and 7) discloses a method for producing a molded body, a material with a SiC surface being heated locally in the presence of air by means of a radiation source. Air can be considered a reaction gas.

Therefore, D1 or D2 is prejudicial to the novelty of claims 1 and 6.

3. The subject matter of claim 2 does not satisfy the requirements of PCT Article 6 and PCT Article 33(3). The reasons are as follows:

Claim 2 is defined in part in terms of a result to be achieved, namely: "the reaction gas being of such a nature that it can extract the metal in the metallic carbide in the given temperature range and leave carbon behind."

Since claim 2 does not contain all of the method features essential to executing the invention, an inventive step cannot yet be acknowledged (PCT Article 33(3)).

4. The combination of claims 1 + 2 + 3 appears to satisfy the requirements of PCT Article 6 and PCT Article 33(2) and (3). The reasons are as follows:

Although documents D1 and D2 disclose a method with local heating by means of a laser, this is carried out in the presence of air and at a higher temperature.

Document D6 (page 45, lines 9-23) describes a method for converting a silicon carbide surface into carbon, a

carrier gas (argon) that is loaded with a halogen (chlorine) being used as the reaction gas. It is further mentioned that the surface can also be structured using conventional etching processes, *inter alia* for self-lubricating surfaces.

However, there is nothing to suggest combining D1 or D2 with D6.

5. The subject matter of claim 5 likewise appears to satisfy the requirements of PCT Article 33(2) and (3). The reasons are as follows:

Although documents D1 and D2 disclose a method with local heating by means of a laser, this is carried out in the presence of air and at a higher temperature.

Document D7 (claims) describes a method for converting a silicon carbide surface into carbon, the SiC molded body being heated to a temperature of between 1600 and 2200°C in a vacuum or a protective gas.

However, there is nothing to suggest combining D1 or D2 with D7.

The method according to claims 3 and 5 prevents the carbon that is formed from being oxidized.

## Patentansprüche

1. Verfahren zur Herstellung eines Formkörpers, dadurch gekennzeichnet, dass ein Werkstoff mit einer Metallcarbid-Oberfläche in Anwesenheit eines Reaktionsgases, eines Schutzgases oder in einem Vakuum mittels einer Strahlungsquelle in einem definierten Bereich seiner Oberfläche derart erhitzt wird, dass es in diesem Bereich zu einer lokalen Umwandlung des Metallcarbids in Kohlenstoff kommt.
2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass das Metallcarbid mit Hilfe einer Strahlungsquelle lokal bestrahlt und dabei auf 600-1500°C erhitzt wird und die Metallcarbid-Oberfläche dabei einem Reaktionsgas ausgesetzt wird, wobei das Reaktionsgas derart beschaffen ist, dass es in dem vorgegebenen Temperaturbereich das Metall des Metallcarbids herauszulösen vermag und Kohlenstoff zurücklässt.
3. Verfahren nach Anspruch 2, dadurch gekennzeichnet, dass als Reaktionsgas ein mit einem Halogen versetztes Trägergas verwendet wird.
4. Verfahren nach Anspruch 3, dadurch gekennzeichnet, dass als Halogen Chlor und als Trägergas Argon verwendet wird.
5. Verfahren nach Anspruch 1, dadurch gekennzeichnet, dass die mit einer Strahlungsquelle bestrahlte Oberfläche lokal auf mehr als 1500°C und weniger als 2200°C erhitzt wird und einem Vakuum oder Schutzgas ausgesetzt wird, wobei sich Metallcarbid ohne Beteiligung fremder Elemente in Metall und Kohlenstoff zersetzt.
6. Verfahren nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, dass als Strahlungsquelle ein Laser, eine Mikrowelle oder ein Elektronenstrahl verwendet wird.